Cover Letter

District Learning Assignments

Teacher: Mrs. Peltz

Student and Parent Office Hours: Email and or Cyber High Chat: M-F, 10:00 am to 12:00 pm

Email: tpeltz@tusd.net

Zoom meeting will be set individually as needed

Directions:

Each packet has an assignment sheet

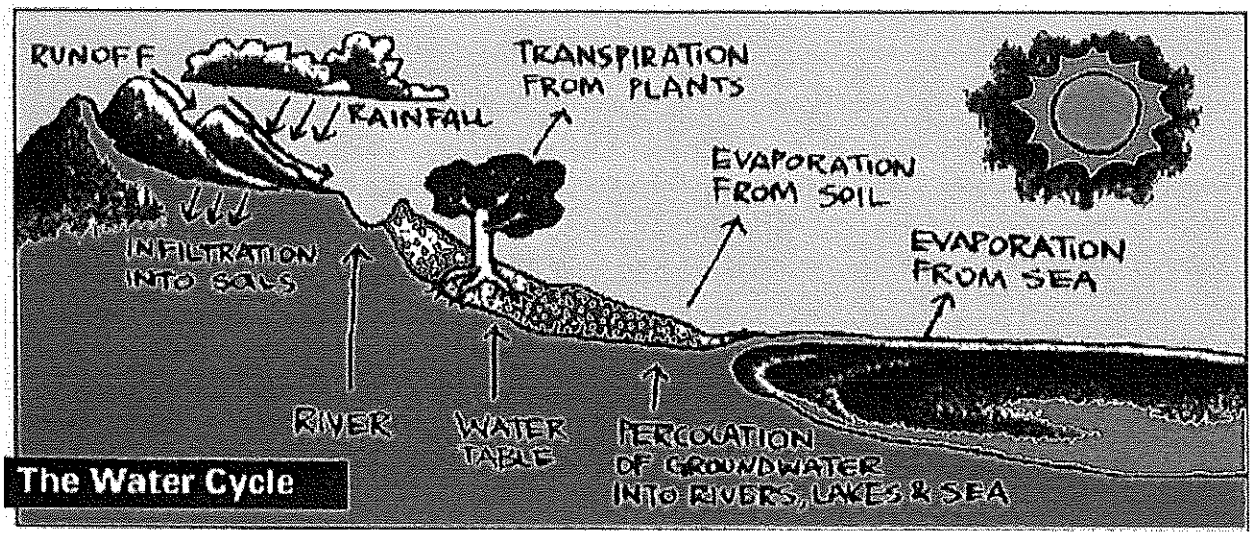
- Complete assigned work for each class per assignment sheet
- Make sure to put your name and student ID on each page
- Use any available resources
- The Worksheets will be graded
- Score of at least 60% required to earn full credit for each packet

Packets are due 5/15/2020; (will email time and place to drop them off)

Environmental Science

Assignments: May 4 – May 8

Monday
Do pgs. 56-58
Tuesday
Do pgs. 59-61
Wednesday
Do pgs 62-64
Thursday
Do pgs 65-67
Friday
Do pgs. 68



One possible path that water may take through the water cycle is as follows. It is important to recognize that this is a cycle; there is no starting point or ending point. Water is in constant motion.

- **Evaporation**. The Sun shines on Earth's surface, increasing its temperature. Often, as the Sun shines on bodies of water, such as the ocean, the water molecules evaporate. The liquid water molecules turn to a gas and rise into the atmosphere.
- **Condensation.** Once in the atmosphere, water vapors cool. This is condensation. The water then forms into clouds, and winds move them over the Earth's surface.
- **Precipitation.** Clouds eventually become saturated with water and that water begins to fall to the ground in the form of precipitation. Solid precipitation is in the form of sleet or snow. Liquid precipitation is rain. Precipitation may fall on any spot on Earth.
- **Infiltration.** This process happens when some of the precipitation that falls onto the Earth's surface seeps into the ground. The water may eventually become part of the ***groundwater***, a system of underground water that resides in the soils and within the rocks there. All water that enters the ground eventually makes its way to a larger body of water and eventually the ocean.

- **Runoff.** Some precipitation that falls to the ground cannot seep into the soil. It may be met with an impermeable surface, such as a parking lot or other paved surfaces. This water will move along the surface, eventually making it to a larger body of water.
- **Transpiration.** Not all water evaporates from large bodies of water. There is a biological player in the movement of water from the surface to the atmosphere. This is the process of transpiration. Plants transpire (release) water from their leaves into the atmosphere. This water will become part of the water cycle.

The water cycle works at different speeds in different places. Where the temperature is always warm, the cycle speeds up. Water evaporates more quickly into the clouds and falls more often as rain. This means that some places get more precipitation than others. Where do you think the cycle works most quickly, near the poles or near the equator?

ACTIVITY 17: Try This

***Directions*:** Choose the correct definitions of the terms below:

1. Precipitation

   A. changing from liquid to gas
   B. changing from gas to liquid
   C. water falling to the ground
   D. water evaporating from plants

2. Transpiration

A. water found in clouds
B. water found in the ground
C. water evaporating from leaves
D. water falling to the ground

3. Condensation

A. formation of clouds as gas changes to liquid
B. movement of water as it changes from liquid to gas
C. water falling to the ground as snow or rain
D. water moving along the surface

4. Evaporation

A. change from a solid to a liquid
B. change from a liquid to a solid
C. change from a gas to a liquid
D. change from a liquid to a gas

ACTIVITY 18: Trace a Path

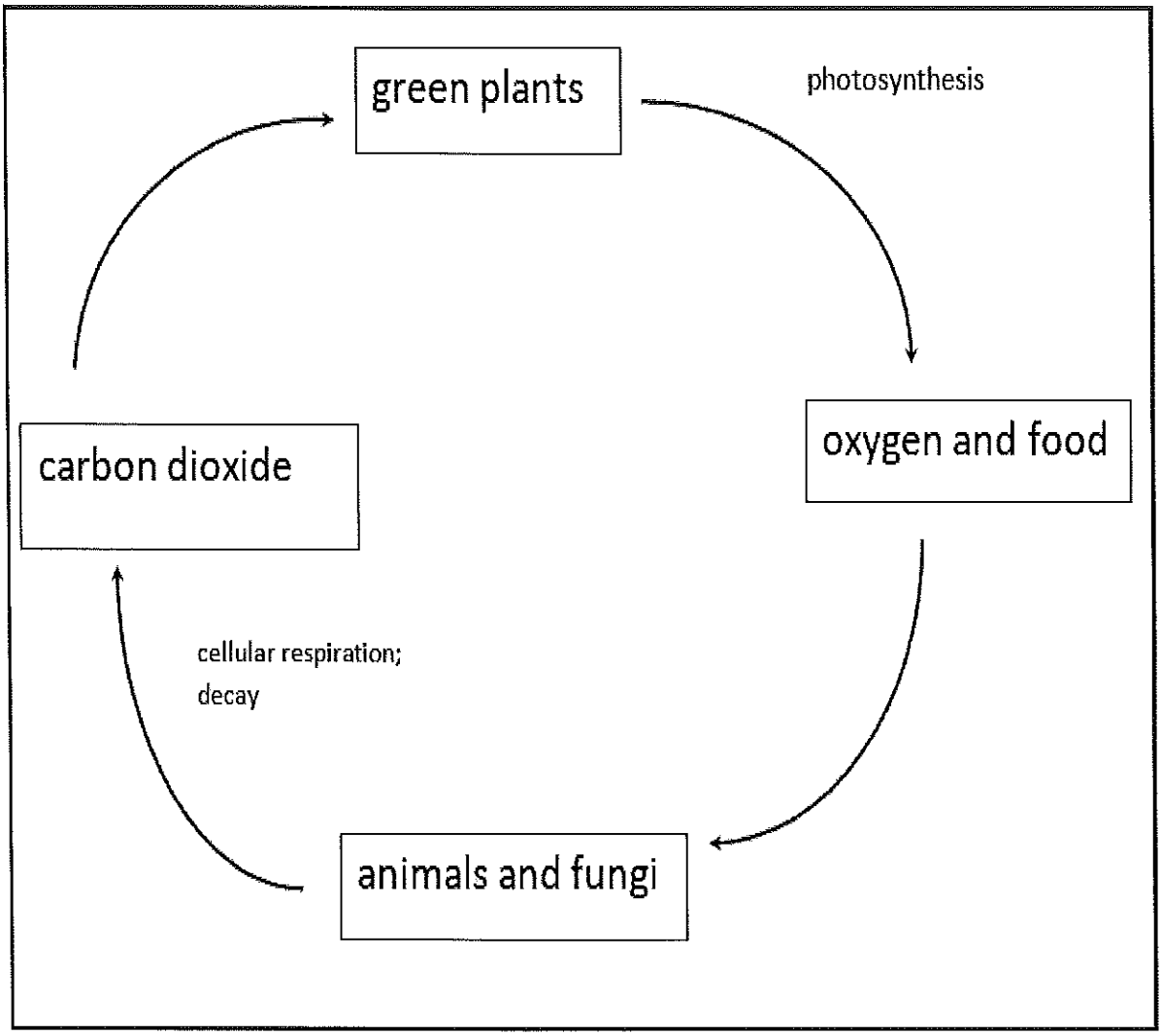
Directions: Fill in the blanks below, tracing the path of a water drop through the water cycle.

Cassie needs to water her garden. She fills the watering can and spreads the water on her garden. The plants use some of the water, while some of the water seeps into the ground and becomes part of the 1. _____. She accidentally spills water on the sidewalk, which is then 2. _____. The plant may release some water into the atmosphere through the process of 3. _____. Eventually, over a long time, the water in the ground makes it to a large lake nearby. As the Sun shines on

the surface of the lake, some water may 4. _____. As that water cools in the atmosphere, it can form clouds through the process of 5. _____. If the clouds become heavy enough, the water will fall to the ground as 6. _____, starting the cycle anew.

The Carbon – Oxygen Cycle

Carbon and oxygen cycle through the environment, from biotic to abiotic factors, by the processes of photosynthesis and cellular respiration.



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In this diagram, a producer absorbs carbon dioxide. Through a process called ***photosynthesis***, an organism makes a more complex compound, a sugar called glucose. Carbon in sugar is converted back to carbon dioxide by a process called ***cellular respiration***. Consumers use the energy and matter of that complex compound to make their own complex compounds. Waste products and dead bodies from living organisms are broken down into simple products again. The simple elements pass into the physical environment and are stored there or recycled. Let's look at photosynthesis and cellular respiration in more detail.

Photosynthesis

Energy cannot be reused. Therefore, ecosystems need a continuous supply of energy to survive. Almost all of the energy available to us on Earth comes from the Sun. Sunlight strikes the leaves or needles of green plants. Plants trap some of this energy and transform it into chemical energy. This process, known as ***photosynthesis***, is illustrated in the equation below.

carbon dioxide + **water** $\xrightarrow{\text{sunlight}}$ **sugar** + **oxygen**

In nature, the same number of elements entering a reaction comes out after the reaction. To be exact, the equation should read:

$$6\,CO_2 + 6\,H_2O \longrightarrow C_6H_{12}O_6 + 6\,O_2$$

If you take a glass of water, bubble in carbon dioxide, and put the glass in the sun, you will never get sugar. Photosynthesis only takes place in the ***chloroplasts*** (small organs in the leaves of green plants). ***Chlorophyll*** inside the chloroplasts uses the Sun's energy to make food. Four things are needed for photosynthesis:

1. light energy from the sun
2. chlorophyll
3. water
4. carbon dioxide

What does chlorophyll do that a plain glass of water cannot do? It captures the light energy and drives a series of reactions that would not happen without that energy. The reactions have two phases: the light phase and the dark phase. Chlorophyll captures the light energy from the sun in the first phase. For this reason, it is called the ***light phase***. The captured energy splits water into hydrogen and oxygen. The oxygen passes out of the leaf, but the hydrogen stays behind. The second phase is called the ***dark phase*** because it does not need light. In the dark phase, the hydrogen freed up earlier combines with carbon dioxide to form sugar.

Each reaction in the dark phase releases a little more energy and allows an electron to flow from one compound to the next. At the end, the oxygen in water has lost electrons and the carbon in carbon dioxide has gained them. Some light energy is converted to food energy and some energy is used up.

ACTIVITY 19: Try This

Directions: Follow the steps below that will help you investigate photosynthesis.

Materials

You will need: a tall drinking glass, water, a large leaf, a sunny location

STEP 1: Fill a tall drinking glass with water. Let the water stand until there are no bubbles remaining.

STEP 2: Pick a leaf from a tree or bush in a sunny location outside. Place the leaf in the glass and observe what happens.

1. What do you notice forming on the leaves?

   A. bubbles
   B. dark spots
   C. small tears
   D. faded spots

2. Which of the following created what you see?

   A. cellular respiration
   B. gravity
   C. oxygen
   D. photosynthesis

3. There are tiny openings on the underside of the leaf. These openings allow oxygen to leave the leaf and *what* to enter it?

   A. more oxygen
   B. hydrogen
   C. carbon dioxide
   D. minerals

ACTIVITY 20: Check Your Understanding

Directions: Answer the following questions about photosynthesis to check your understanding.

1. The products of photosynthesis are:

   A. glucose, water, and oxygen
   B. sunlight
   C. carbon dioxide and water
   D. food

2. The reactants of photosynthesis are:

   A. glucose, water, and oxygen
   B. sunlight
   C. carbon dioxide and water
   D. food

3. Where, specifically, does photosynthesis occur?

   A. outside
   B. in the chloroplasts of plants
   C. in the chloroplasts of animals
   D. in the soil

Cellular Respiration

A farmer takes a small pumpkin seed and plants it in a large pot of dry soil. She weighs the soil and the seed together. Then she waters her plant and lets the pumpkin plant grow. Huge vines spread and large pumpkins appear at the ends of the vines. The soil, however, does not disappear. If the grown plant is dried with the soil and weighed, the result is much heavier than the original soil. The matter

in the plant had to come from somewhere. The green leaves of the pumpkin trapped carbon dioxide from the air and water from the soil and combined these two compounds together to form sugar and other plant tissues.

What happened to the energy of the sunlight? It was trapped in the plant tissue. If a pumpkin is burned, it will produce light and heat, which is a way of releasing the stored chemical energy.

The equation for burning that pumpkin or any product with carbon is:

sugar + oxygen $\xrightarrow{\text{produce}}$ carbon dioxide + water + energy

The process is practically the reverse of photosynthesis. It is called ***cellular respiration***. Keep in mind that this is not the same as breathing The equation for cellular respiration looks like this:

sugar + oxygen $\longrightarrow$ carbon dioxide + water + energy

$$C_6H_{12}O_6 + 6\,O_2 \longrightarrow 6\,CO_2 + 6\,H_2O + \text{Energy}$$

Like photosynthesis, the path from reactants (sugar and oxygen) to products (carbon dioxide and water) proceeds through a large number of steps. Even if the organism does not eat sugar, all the foods end up being broken down into products that can enter the respiration cycle. Fats, starches, and proteins are all digested to form smaller compounds. These small compounds can then enter the cell and be part of the respiration cycle that releases energy, carbon dioxide, and water.

ACTIVITY 21: Try This

Directions: Compare the two formulas below and fill in the blanks.

1. carbon dioxide + 1. _____ → glucose + water + 2. _____

   This is the equation for 3. _____.

2, 4._____ + oxygen → water + 6_5. _____ + energy

   This is the equation for 6._____.

The Carbon Cycle, Part Two

In photosynthesis, oxidized carbon is reduced to the carbon of organic molecules by solar energy. Combustion and respiration by plants, animals, and bacteria (decay) later oxidize the organic carbon back to CO_2 and CO or, by anaerobic decay (a process that occurs without oxygen), to CH_4. The carbon-containing sediments of the solid earth are by far the largest repositories of carbon, but they cycle their carbon very slowly. In contrast, carbon cycling among life, the atmosphere, and the hydrosphere is rapid.

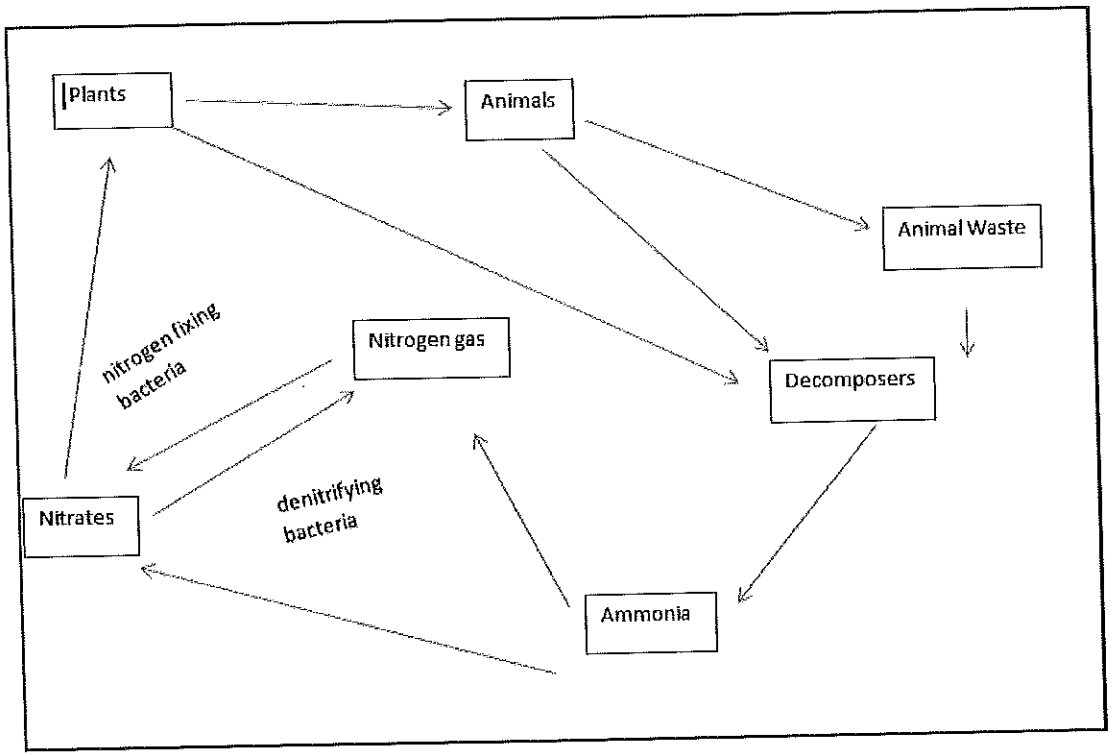
Most of the natural input of carbon monoxide into the atmosphere arises from the oxidation of methane, CH_4, in the atmosphere and from reactions involving the degradation of the plant pigment, chlorophyll. Carbon monoxide is eventually oxidized to CO_2. Natural sources contribute ten times more carbon monoxide to the atmosphere than humans do.

The carbon cycle is connected to the oxygen cycle by photosynthesis and respiration and to the water cycle by exchange (partly by rain) at the hydrosphere-atmosphere boundary. Living organisms provide most of the pathways in the carbon cycle.

Because the carbon cycle has so many paths from one compound to another, it can better adjust to small, short-term disturbances. Automobile exhaust has added carbon dioxide and carbon monoxide to the atmosphere along with particles and other chemicals.

The Nitrogen Cycle

An element of key importance to all living things is nitrogen. It occurs in proteins, large complex organic molecules that are involved in all the important activities of the living cell.



Should any of the several steps in the nitrogen cycle fail to operate, life on Earth would be in danger. If nitrogen disappeared, or if it stayed in the air as inactive gas, living things could not build proteins. And proteins are responsible for just about all the functions that an organism needs to survive. Also, if nitrogen stayed in the form of ammonia (a compound of nitrogen and hydrogen), living things would be poisoned by the ammonia. Each of the steps in the nitrogen cycle is necessary to maintain life.

All plants and animals need nitrogen to survive. Nitrogen is one of the most common elements in our environment. It is the most abundant element in the atmosphere, comprising 78% of the atmosphere compared to oxygen's 21%. Yet the atmospheric nitrogen (present in the chemical form, N_2) that surrounds us all the

time cannot be used directly by most organisms. We inhale it with every breath, and then exhale it. It is not taken into the body. Ammonia (NH_3), nitrate (NO_2), and nitrate (NO_3) are "fixed" forms of nitrogen. Most plants and animals use the so-called fixed nitrogen for growth.

Atmospheric (found in the atmosphere) nitrogen (N_2) can be changed to fixed nitrogen in various ways. Certain bacteria and algae are able to fix atmospheric nitrogen. Some of these organisms live free in the soil, while others gather in colonies on the roots of certain plants called ***legumes***. Some common legumes are peas, beans, and alfalfa. Lightning and the action of sunlight on atmospheric nitrogen also help to synthesize fixed nitrogen compounds. In recent years, modern factories have been producing many millions of tons of nitrogen fertilizers.

Fixed nitrogen can be absorbed by plants and then passed into the food web. Animals eat the plants, and in turn are eaten by other animals. The nitrogen may now cycle for a considerable time. Organic decay might return it to the soil, or it might be digested and returned to the soil through feces or urine. Once in the soil, the nitrogen will be recycled back to animals.. Because recycling is so efficient, an entire ecosystem can usually be supported by a small amount of nitrogen fixation. ***Denitrifying*** (removing nitrogen) from bacteria and fire are responsible for this process.

Atmospheric Nitrogen		**Fixed Nitrogen**
(N_2) is plentiful but not usable by most plants and animals.	**is converted to...**	is necessary for the growth of plants and animals.

To ***"fix"*** means to make firm or stable. In this sense, a gas (which is not firm) can be fixed by binding it in some form of solid or liquid.

In agricultural systems, nutrient cycling is incomplete. A kernel of wheat does not return to the soil. Rather, it is loaded onto a truck, shipped to a distant city, sold,

and eaten. The nitrogen-rich urine and feces of the person who eats the wheat is dumped into a sewer and is not generally returned to the field. Since grain crops cannot fix nitrogen themselves, farmers must fertilize soil.

Nitrogen fertilization is accomplished by any of three techniques. The simplest method is to fertilize the soil by recycling plant and animal wastes. Another technique is ***crop rotation***. This involves planting legumes and grains in alternate years in order to maintain soil nitrogen. Finally, chemists have learned to manufacture fertilizer by producing ammonia. Today, large quantities of fertilizer are manufactured in this manner. Some people estimate that ***industrial fixation*** accounts for one-third of the total yearly production of nitrogen compounds on the Earth.

Atmospheric Nitrogen	+	**Hydrogen**	*industrial processes*	**Ammonia**
N_2	+	H_2	⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯⋯▶	2 NH_2

In the nitrogen cycle, a balance must be kept between the process which changes the nitrogen of the air into a combined form that plants and animals can use, and the process which restores gaseous nitrogen to the air. Some people think that more and more food can be easily grown to take care of larger and larger populations. Those who understand the nitrogen cycle, however, realize that this would cause an increasing nitrogen imbalance.

ACTIVITY 22: Journaling

Directions: Cycles are like circles going around and around. Life has cycles. If you observe a garden, empty field, or farmland from season to season, or year to year, they all go through cycles. You are probably very familiar with the seasons and how they look around your area. Look at your life and think about how the seasons influence you. Refer to famous people, real or fictional for examples of how